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(71) Applicant (for all designated States except US): **NORTH CAROLINA STATE UNIVERSITY** [US/US]; 2401 Research Drive, Suite 1122, Campus Box 8210, Raleigh, NC 27695-8210 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **JOHNSON, Mark, Allan, Lamonte** [US/US]; 1023 West South Street, Raleigh, NC 27603 (US). **BARLAGE, Douglas, William** [US/US]; 2809 Montcastle Court, Durham, NC 27705 (US).

(74) Agent: **HUNT, Gregory, A.**; Jenkins, Wilson & Taylor, P.A., Suite 1400, University Tower, 3100 Tower Boulevard, Durham, NC 27707 (US).

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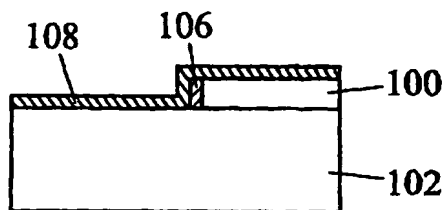
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(54) Title: METHOD AND SYSTEMS FOR SINGLE- OR MULTI-PERIOD EDGE DEFINITION LITHOGRAPHY



(57) Abstract: Methods and systems for multiperiod, edge definition lithography are disclosed. According to one method, a first material (104) is isotropically deposited on a substrate (102) and on a field mesa (100) also located on the substrate (102). The first masking material (104) is then anisotropically removed from the substrate (100) to leave a nanometer-pitched sidewall (106) adjacent to the field mesa. A second masking material (108) is then isotropically deposited on the substrate (102), the sidewall (106), and the field mesa (100). The second masking material (108) is then anisotropically removed from the substrate (102) to leave a second nanometer-pitched sidewall (110) adjacent to the first sidewall (106). The process may be repeated to create alternating nanometer-pitched

sidewalls of the first (104) and second (108) masking materials. One of the first (104) and second (108) masking materials may then be etched from the substrate (102) to leave nanometer-pitched channels (114) in one of the masking materials. The channels (114) may be used to etch nanometer-pitched features in the substrate (102).

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# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US04/08724

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : H01L 21/338, 21/336

US CL : 438/173, 268, 274

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 438/173, 268, 274, 142, 175, 197, 212,

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
Please See Continuation Sheet

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 6,214,246 B1 (CRAIGHEAD) 10 April 10 2001 (04.10.2001), Figs. 8-9; Col. 9, lines 12-35.	1-24
Y	JP 2003-045325 A (HATAI et al.) 14 February 14 2003 (14.02.2003), Abstract; Figs. 1(a) - 1(f).	1-24
Y,P	EP 1319948 A2 (DONG) 18 June 2003 (18.06.2003), Abstract; Col. 7, line 34 - Col. 8, line 34; Figs. 2-8.	1-24
Y,P	US 6,593,065 B2 (SCHERER) 15 July 2003 (15.07.2003), Figs. 1(a) - 1(d) and 4 - 5(f); Col. 3, line 21 - Col. 5, line 5.	1-24
A	JP 2003-073859 A (WADA et al.) 12 March 2003 (12.03.2003)	1-24
Y,T	US 6,709,929 B2 (ZHANG et al.) 23 March 2004 (23.03.2004), Figs. 2A - 5F, Col. 6, line 36 - Col. 11, line 24.	1-24
Y,P	JP 2004-034270 A (II et al.) 05 February 2004 (05.02.2004), Abstract, Fig. 4.	1-24

☐ Further documents are listed in the continuation of Box C.

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Mail Stop PCT, Attn: ISA/US  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, Virginia 22313-1450

Facsimile No. (703) 305-3230

Authorized officer

Olik Chaudhuri

Telephone No. (571) 272-1855

*[Signature]*

# INTERNATIONAL SEARCH REPORT

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PCT/US04/08724

Continuation of B. **FIELDS SEARCHED** Item 3:  
EAST (USPAT, USPGPUB, EPO, JPO, DEWENT, IBMTDB)  
(nanometer or nonoscale) same (groove or mesa or trench or hole); etch\$3 or pattern\$4; channel with substrate